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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,412	11/21/2003	Yasunari Sugita	10873.1333USW1	3355
23552	7590	07/09/2004	EXAMINER	
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			TSAI, H JEY	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/719,412	SUGITA ET AL.	
	Examiner	Art Unit	
	H.Jey Tsai	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 9-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/12/04, 3/29/04</u> . | 6) <input type="checkbox"/> Other: _____ |

Election/Restriction

Applicant's election of claims 1-8 in the reply filed on April 22, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-8 are rejected under 35 U.S.C. § 102(e) as being anticipated by Inomata et al. 2003/0197984.

Inomata discloses a method for producing a magnetoresistive element comprising a tunnel insulating layer, and a first magnetic layer and a second magnetic layer that are laminated so as to sandwich the tunnel insulating layer, wherein a resistance value varies depending on a relative angle between magnetization directions of the first magnetic layer and the second magnetic layer (see para. 3), the method comprising the steps of:

(i) laminating a first magnetic layer Ni_8Fe_2 , a third magnetic layer Co_9Fe and an Al layer successively on a substrate, para. 136,

(ii) forming a tunnel insulating layer (e.g. layer 15 or 26, figs. 1+) containing at least one compound selected from the group consisting of an oxide, nitride and oxynitride of Al by performing at least one reaction selected from the group consisting of oxidation, nitriding and oxynitriding of the Al layer, para. 136,

(iii) forming a laminate comprising the first magnetic layer, the tunnel insulting layer and a second magnetic layer by laminating the second magnetic layer Co_9Fe in such a manner that the tunnel insulating layer is sandwiched by the first magnetic layer and the second magnetic layer,

wherein the third magnetic layer Co_9Fe has at least one crystal structure selected from the group consisting of a face-centered cubic crystal (fcc) structure and a face-centered tetragonal crystal structure and is (111) oriented parallel to a film plane of the third magnetic layer, para. 98 and figs. 1+.

the composition of third magnetic layer is $\text{Co}_x\text{Fe}_{1-x}$, ($0.5 \leq x \leq 1$, e.g. Co_9Fe , 90% and 10%, respectively) and Ni_8Fe_2 , (80% and 20%, respectively), (meeting claims 3-4),

magnetic material contains at least one of element selected from the group consisting of Ag, Pd, Pt, and Au, such as CoPt , para. 76-79 and para. 144, 158,

an antiferromagnetic layer 11 between first magnetic layer and substrate, fig. 1 and para. 64, 133-135,

heat treating the laminate structure after step (iii), para. 139.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shang et al., J. of Applied Physics, vol. 89, no. 11, pages 6874-6876, cited by applicants, in view of Inomata et al. 2003/0197984.

The reference(s) teach the features:

Shang et al. substantially discloses a method for producing a magnetoresistive element comprising a tunnel insulating layer, and a first magnetic layer and a second magnetic layer that are laminated so as to sandwich the tunnel insulating layer, wherein a resistance value varies depending on a relative angle between magnetization directions of the first magnetic layer and the second magnetic layer (see introduction, p. 6874+), the method comprising the steps of:

(i) laminating a first magnetic layer NiFe, a third magnetic layer NiFe and an Al layer successively on a substrate, see experiments,

(ii) forming a tunnel insulating layer (barrier layer) containing at least one compound selected from the group consisting of an oxide, nitride and oxynitride of Al by performing at least one reaction selected from the group consisting of oxidation, nitriding and oxynitriding of the Al layer,

(iii) forming a laminate comprising the first magnetic layer, the tunnel insulting layer and a second magnetic layer by laminating the second magnetic layer NiFe in

such a manner that the tunnel insulating layer is sandwiched by the first magnetic layer and the second magnetic layer,

wherein the third magnetic layer NiFe has at least one fcc crystal structure (111) oriented parallel to a film plane of the third magnetic layer, para.98,

the composition of third magnetic layer is $\text{Co}_x\text{Fe}_{1-x}$, ($0.5 \leq x \leq 1$, e.g. Co_9Fe , 90% and 10%, respectively) and Ni_8Fe_2 , (80% and 20%, respectively), (meeting claims 3-4),

magnetic material contains at least one of element selected from the group consisting of Ag, Pd, Pt, and Au, such as CoPt, para. 76-79 and para. 144, 158,

an antiferromagnetic layer 11 between first magnetic layer and substrate, fig. 1 and para.64, 133-135,

heat treating the laminate structure after step (iii), para. 139.

The difference between the reference(s) and the claims are as follows: Shang et al. teaches forming a first, second and third magnetic layers having a (111) orientation and a tunnel layer formed by nitridation but does not teach that (111) oriented magnetic layer is a fcc structure and the composition of magnetic material. However, Inomata et al. teaches at para. 98, a magnetic material having fcc crystal structure of (111) orientation and at para. 133-139, 144, 158, the composition of magnetic material, such as the composition of third magnetic layer is $\text{Co}_x\text{Fe}_{1-x}$, ($0.5 \leq x \leq 1$, e.g. Co_9Fe , 90% and 10%, respectively) and Ni_8Fe_2 , (80% and 20%, respectively), magnetic material contains at least one of element selected from the group consisting of Ag, Pd, Pt, and Au, such as CoPt, para. 76-79 and para. 144, 158, an antiferromagnetic layer 11 between first

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magnetic layer and substrate, fig. 1 and para.64, 133-135, heat treating the laminate structure after step (iii), para. 139.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized Shang's magnetic material is oriented in (111) and using various composition of magnetic materials as suggested by Inomata et al. because crystalline magnetic material has a stronger magnetic flux in the specific orientation and composition.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number is (703) 308-4357.

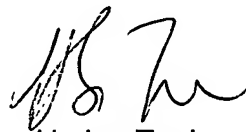
Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (571) 272-1684. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (571) 272-1679.

The fax phone number for this Group is (703) 872-9306.

hjt

6/30/04



H. Jey Tsai
Primary Examiner
Patent Examining Group 2800